C. TECHNICAL DATA

1. Features and Benefits

Safety	Meets CE and IEC 1010 requirements. UL Listed to U.S. and Canadian Safety Standards.
True RMS	Needed to accurately measure non-sinusoidal AC voltage and current waveforms found on many controls and circuits.
Triple Display	Shows more than one reading simultaneously.
Analog Bar Graph	Shows rapidly changing input signals that the normal display will not.
Two-Hold System	Holds two readings on the display at the same time.
Sleep	Automatically powers instrument down after 30 minutes of inactivity, yet will continue acquiring data in its various modes. Pressing any push button or turning the rotary switch returns the 183/185 to normal.
Record	Records Min/Max and Average values. Time reference when value was obtained.
Compare	Compares stored value with measured value for matching components.
Relative Percentage	Displays measured value as a % of stored value for checking component tolerances.
RS232 Output	Transfers data directly to a PC while measuring.
Back Light	Allows viewing in any light condition.
Autorange	Automatically selects the best range for the measurement.

2. Product Applications

Perform the following tests and/or measurements with the TPI 183/185 and the appropriate function:

HVAC/R

DCmV	• Thermocouples in furnaces or gas applications.
ACA	• Heat anticipator current in thermostats.
ACV	• Line voltage.
ACV or DCV	• Control circuit voltage.
DCμA	• Flame safeguard control current.
OHMS	• Heating element resistance (continuity).
OHMS	• Compressor winding resistance.
OHMS	• Contactor and relay coil resistance.
OHMS	• Continuity of wiring.
CAP	• Motor start and run capacitance.
Hz/FREQ	• Frequency on controls and line voltage.
REC	• Record min/max voltage of controls and line voltages.
DCmV	• Temperature with optional temperature adapter (A310).
ALL	• Bar graph to indicate rapid fluctuations in measurements.

ELECTRICAL

ACV	• Measure line voltage.
OHMS	• Continuity of circuit breakers.
Hz/FREQ	• Frequency of line and control voltage.
DCV	• Voltage of direct drive DC motors.

ELECTRONIC

ACV	• Measure power supply voltage.
OHMS	• Continuity of circuit breakers.
REL%	• Match components
COMP	• Compare readings in circuits or components
Hz/FREQ	• Frequency of line and control voltage.

3. Specifications

CE **IEC 1010 Over Voltage:**
CAT II - 1000VDC ,750VAC
CAT III - 600V
Pollution Degree 2

c UL us
LISTED
UL 3111-1

※ INSTALLATION Ⅰ · Ⅱ · Ⅲ

INSTALLATION CATEGORY(OVERVOLTAGE CATEGORY) Ⅰ
: Signal level, special equipment or parts of equipment, telecommunication, electronic etc., with smaller transient overvoltages than INSTALLATION CATEGORY Ⅱ .

INSTALLATION CATEGORY(OVERVOLTAGE CATEGORY) Ⅱ
: Local level, appliances, PORTABLE EQUIPMENT etc., with smaller transient overvoltages than INSTALLATION CATEGORY Ⅲ .

INSTALLATION CATEGORY(OVERVOLTAGE CATEGORY) Ⅲ
: Distribution level, fixed installation, with smaller transient overvoltages than INSTALLATION CATEGORY Ⅳ .

3. Specifications (cont.)

a. DCV

Range	Resolution	Accuracy	Impedance
400mV	0.1mV	±0.3% of reading, ±2 digits	10MΩ
4V	0.001V		
40V	0.01V		
400V	0.1V		
1000V	1V		

b1. ACV (45Hz to 450Hz)

Range	Resolution	Accuracy	Impedance
4V	0.001V	±0.75% of reading, ±5 digits	10MΩ
40V	0.01V		
400V	0.1V		
750V	1V		

b2. ACV (450Hz to 5kHz)

Range	Resolution	Accuracy	Impedance
4V	0.001V	unspecified	10MΩ
40V	0.01V	±2% of reading, ±5 digits	
400V	0.1V		
750V	1V		

b3. ACV (5kHz to 20kHz)

Range	Resolution	Accuracy	Impedance
4V	0.001V	unspecified	10MΩ
40V	0.01V	±2.5% of reading, ±5 digits	
400V	0.1V		
750V	1V	unspecified	

3. Specifications (cont.)

c. DCA

Range	Resolution	Accuracy	Overload Protection
400µA	0.1µA	±0.5% of reading, ±5 digits	Fuse**(fast blow) F600V, .5A, 31CM
4000µA	1µA		
40mA	0.01mA		
400mA	0.1mA		
4A	0.001A	±0.75% of reading, ±5 digits	Fuse**(fast blow) F600V, 10A, 31CM
10A	0.01A		

d. ACA

Range	Resolution	Accuracy	Overload Protection
400µA	0.1µA	±0.75% of reading, ±5 digits	Fuse**(fast blow) F600V, .5A, 31CM
4000µA	1µA		
40mA	0.01mA		
400mA	0.1mA		
4A	0.001A	±1.5% of reading, ±5 digits	Fuse**(fast blow) F600V, 10A, 31CM
10A	0.01A		

e. OHM (Resistance,Ω)

Range	Resolution	Accuracy	Overload Protection
400Ω	0.1Ω	±0. 5% of reading, ±5 digits	600V DC or AC Peak
4kΩ	0.001kΩ		
40kΩ	0.01kΩ		
400kΩ	0.1kΩ		
4MΩ	0.001MΩ	±1% of reading, ±10 digits	
40MΩ	0.01MΩ		

f. Diode Test

Test Voltage	Max Test Current	Over Load Protection
3V	Approx. 2.5mA	600 V DC or Peak AC

⚠ **Warning: Use only correct size, voltage and current rated fuses.
Test Leads: Use only correct type and overvoltage category rating.

3. Specifications (cont.)

g. Continuity Buzzer

Test Voltage	Threshold	Over Load Protection
3V	100 digits	600 V DC or Peak AC

h. Capacitance (183)

Range	Resolution	Accuracy	Over Load Protection
10µF	0.01µF	±2% of reading, ±5 digits	600V DC or Peak AC
100µF	0.1µF		
1000µF	1µF		
10,000µF	1µF	±3% of reading, ±7 digits	

i. Capacitance (185)

Range	Resolution	Accuracy	Over Load Protection
4nF	0.01nF	±2% of reading,±10 digits	600V DC or Peak AC
40nF	0.1nF	±2% of reading	
400nF	1nF	±5 digits	
4000nF	1nF		

j. Frequency

Range	Resolution	Accuracy	Over Load Protection
200.00Hz	0.01Hz	±0.05% of reading, ±2 digits	600V DC or Peak AC
2.0000kHz	0.0001kHz		
20.000kHz	0.001kHz		
200.00kHz	0.01kHz		

3. Specifications (cont.)

I. General Specifications

Max. Volt. between any Input and Ground	1000V
Fuse Protection	**mA:** 0.5Amp/600VAC; **A:** 10Amp/600VAC
Display Type, Digital:	4,000 Count, 4 times per second update
Analog:	2x41 segments, 20 times per sec. update
Operating Temp.	-0° to 40°C (32° to 113°F)
Storage Temp.	-20° to 60°C (-4° to 140°F)
Relative Humidity	**0% to 80%:** (0° - 35°C/32° - 95°F) **0% to 70%:** (35° - 55°C/95° - 131°F)
Temp. Coefficient	0.1 x (Specified Accuracy) per °C for temperature <18°C to >28°C
Altitude operating	6,562ft (2,000meter)
Non-operating	40,000ft (12,000meter)
Power Supply	9 Volt Battery
Battery Life	100 hrs. Alkaline
Size (H x L x W)	33mm x 86mm x 187mm (1.3" x 3.4" x 7.4")
Weight	660g (23.3oz)

D. MEASUREMENT TECHNIQUES

1. Controls and Functions:

Push Buttons

Activates Back Light for the LCD (automatically turns off after approx. 70 sec.)

REC Activates the Min/Max/Ave mode.

COMP Activates the Compare mode.

REL% Activates the REL% mode.

RANGE Activates manual ranging.

EDIT Activates the EDIT mode for the Compare and Relative % functions.

HOLD Activates two-hold data-hold mode.

Activates special dual functions on LCD. (Min/Max time reference)

Rotary Switch

Off Turns the instrument off.

mV Selects the DC mV function.

V Selects the DCV function.

VHz Selects the ACV function. (Push the yellow button to display frequency of measured voltage on lower display.)

Selects the diode test function.

Selects resistance function. (Push yellow button to activate continuity buzzer.)

mA Selects the DC mA function.

A Selects the DCA function. (10A max.)

A Selects the ACA function. (10A max.)

mA Selects the AC mA function.

Selects the Capacitance function.

Hz Selects the Frequency function.

183/185 SPECIFICATIONS ±0.3% Basic DCV Accuracy

Function	Range	Resolution
DCV	400mV	0.1mV
	4V	0.001V
	40V	0.01V
	400V	0.1V
	1000V	1V
ACV	4V	0.001V
	40V	0.01V
	400V	0.1V
	750V	1V
DCA	400µA	0.1µA
	4000µA	1µA
	40mA	0.01mA
	400mA	0.1mA
	4A	0.001A
	10A	0.01A
ACA	400µA	0.1µA
	4000µA	1µa
	40mA	0.01mA
	400mA	0.1mA
	4A	0.001A
	10A	0.01A
OHM	400Ω	0.1Ω
	4kΩ	0.001kΩ
	40kΩ	0.01kΩ
	400kΩ	0.1kΩ
	4MΩ	0.001MΩ
	40MΩ	0.01MΩ
Capacitance (183)	10µF	0.01µF
	100µF	0.1µF
	1000µF	1µF
	10,000µF	1µF
Capacitance (185)	4nF	0.01nF
	40nF	0.1nF
	400nF	1nF
	4000nF	1nF

	Test Voltage	Max Test Current
Diode	3V	Approx. 2.5mA

	Test Voltage	Threshold
Continuity	3V	100 digits

See Pages 12-13 for Frequency, and General Specifications.